



CEC Environmental Performance Report

California Electricity System Overview

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California Electricity System

- **Generation**
 - Merchant Generation, IOU retained Generation, QFs, Municipal and Irrigation Districts Generation, Out of State, Spot Market
- **Transmission**
 - Owned by IOUs and Munis; controlled by System Operators
- **Distribution**
 - Maintained and operated by local electric companies like SMUD, PG&E, City of Vernon.
- **System Operators**
 - Ensures reliability by dispatching resources or curtailing demand as needed (CAISO, LADWP, SMUD, IID)



California's Sources of Generation

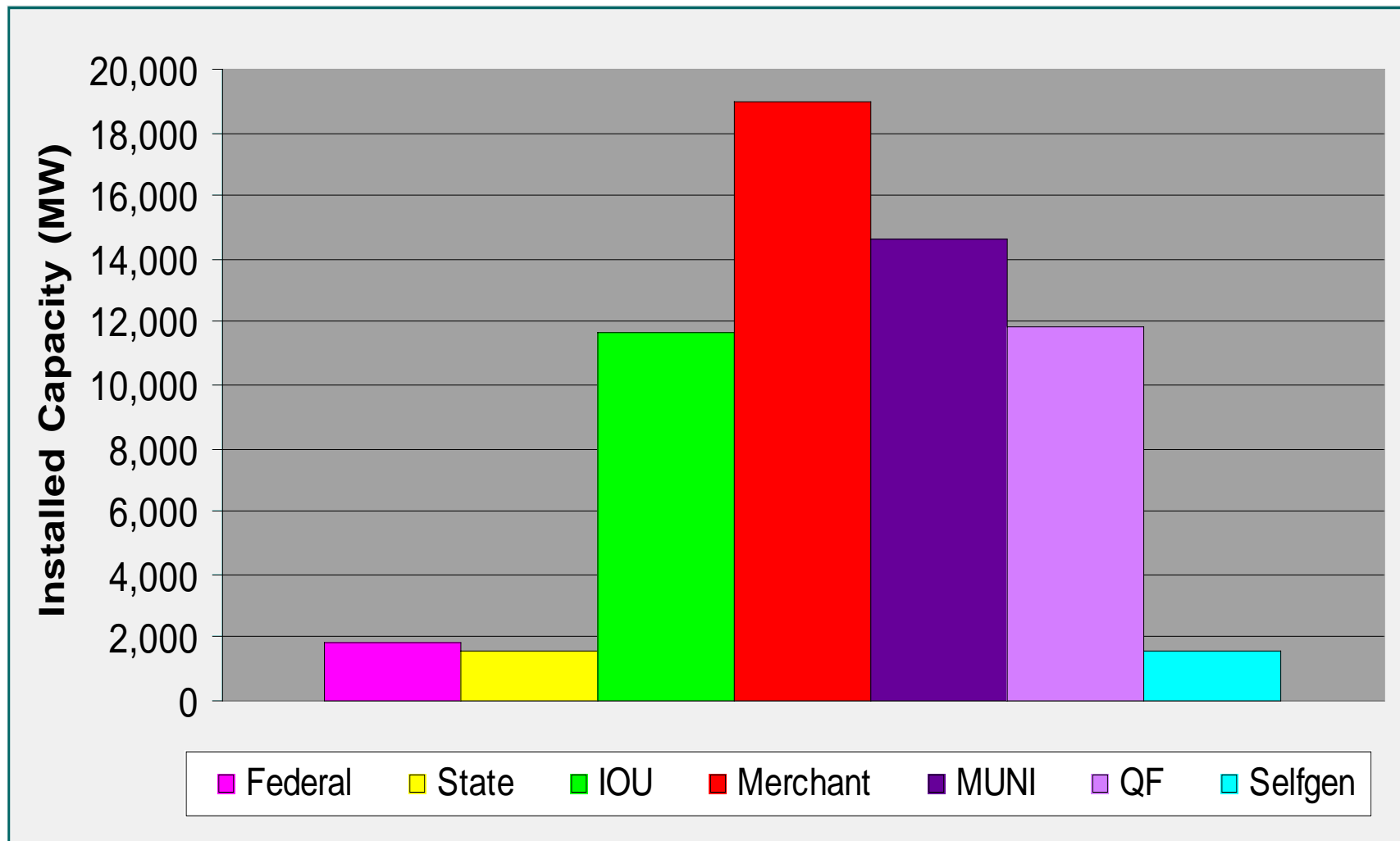
- Merchant Generators
- Qualified Facilities (co-gen and renewable)
- Municipal Utilities
- Regulated Utilities
- Federal and State Government Projects
- Imports from other states, Mexico and Canada
- Self-Generators

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Who Owns Generation Capacity



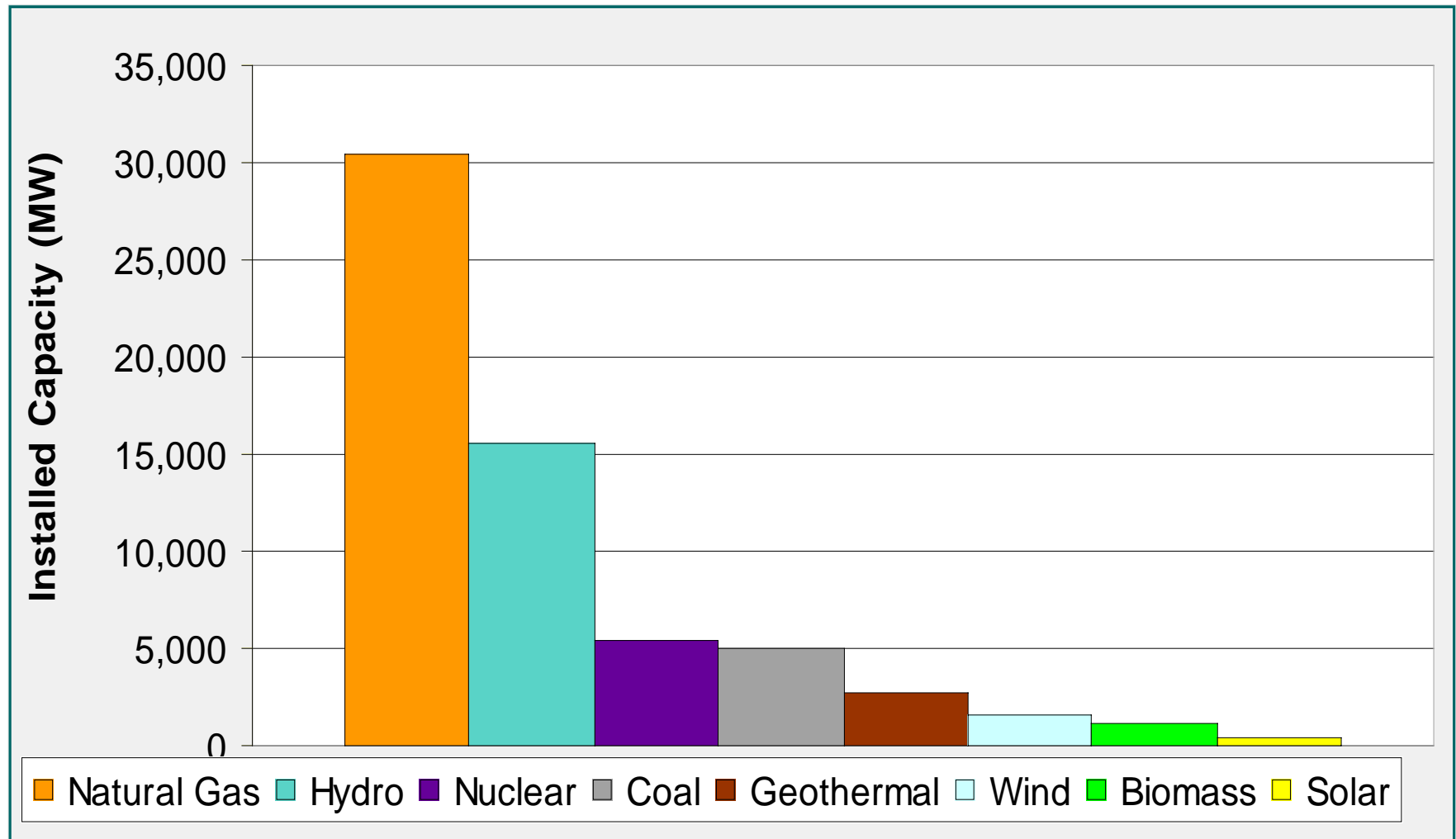
Source: CEC Staff

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Installed Capacity by Fuel Type



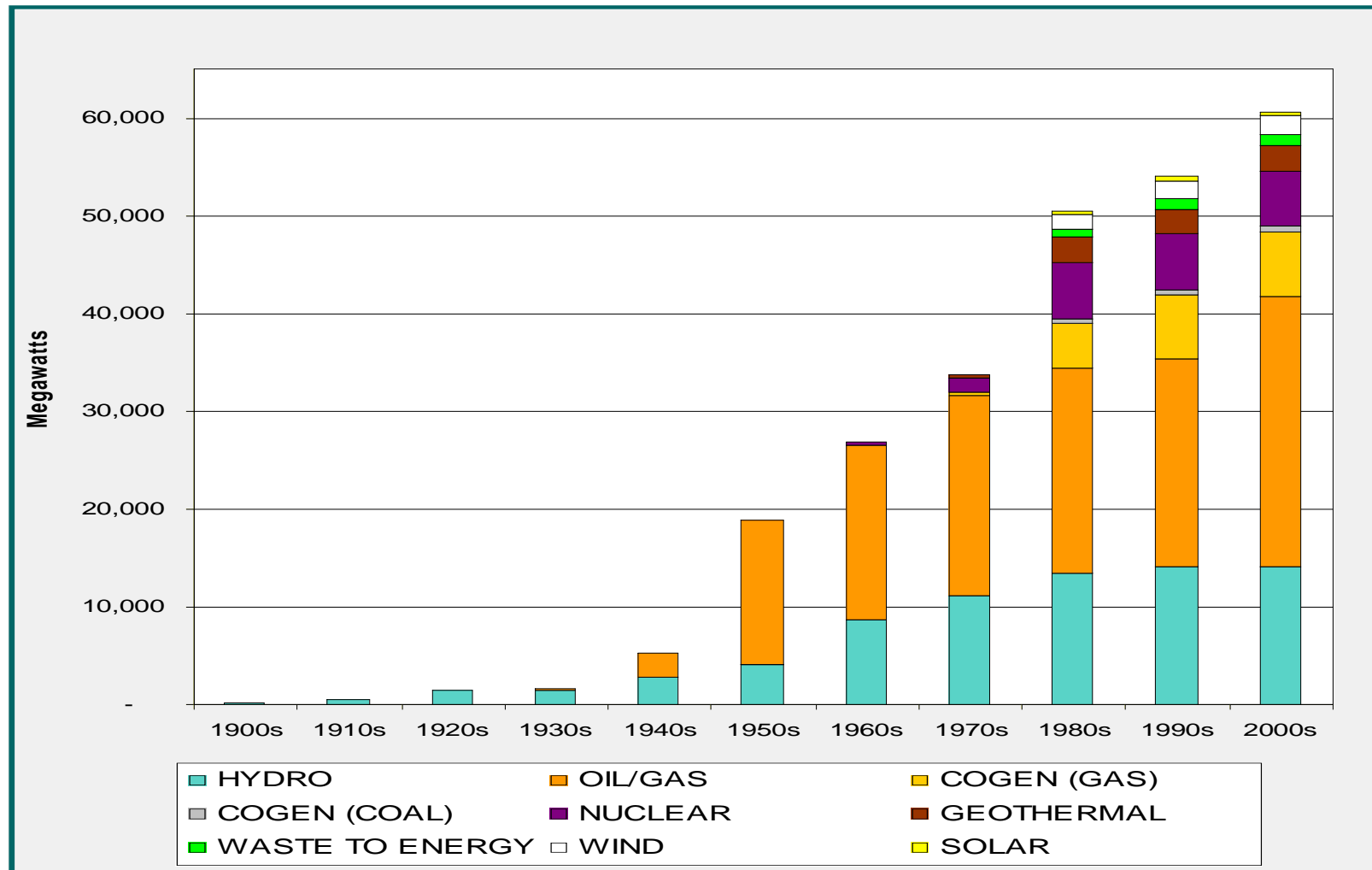
Source: CEC Staff

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Cumulative Generation Capacity by Decade and by Primary Energy Type



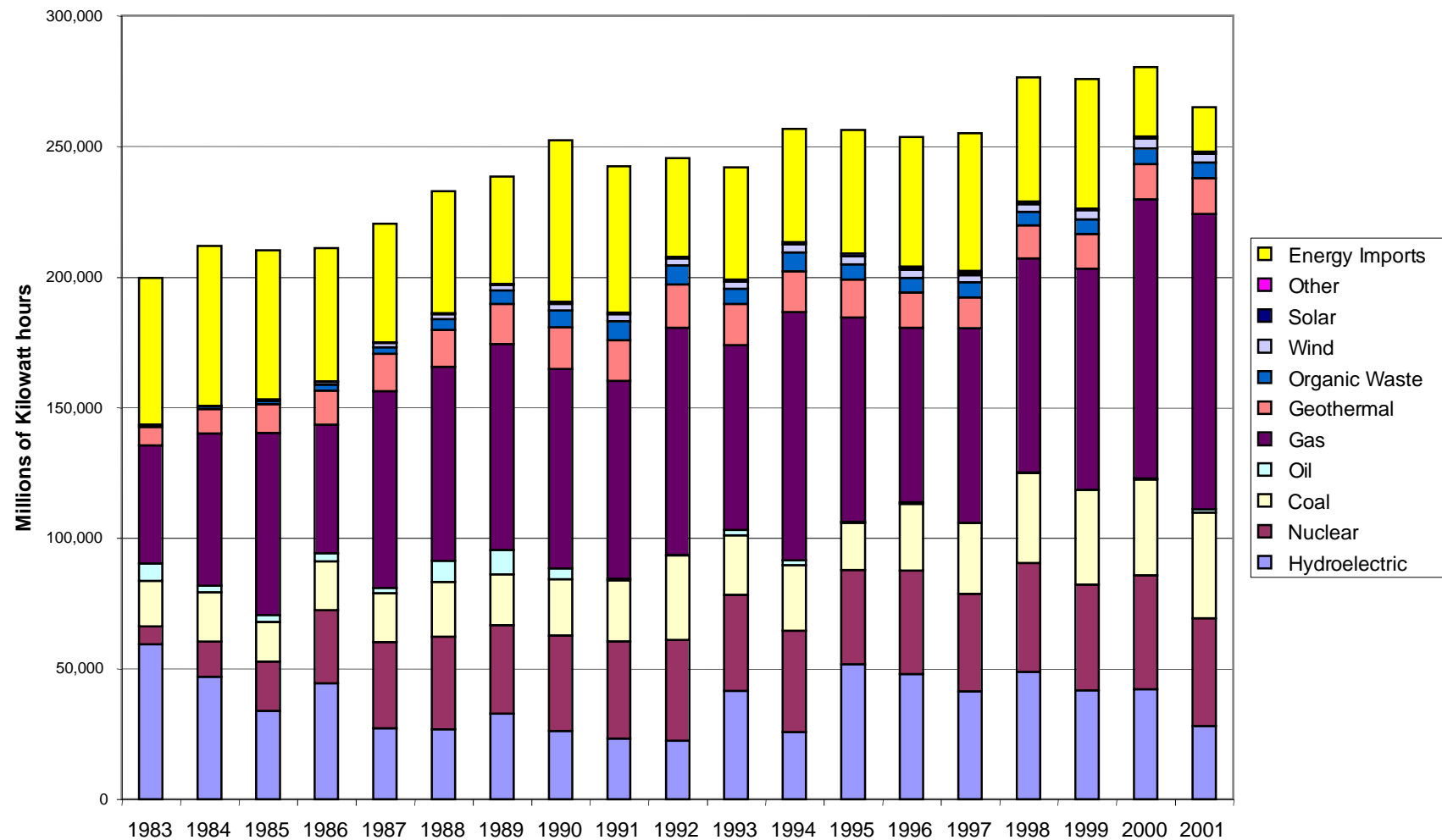
Source: CEC Staff

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Sources of California Electrical Energy Consumption



Source: CEC Staff

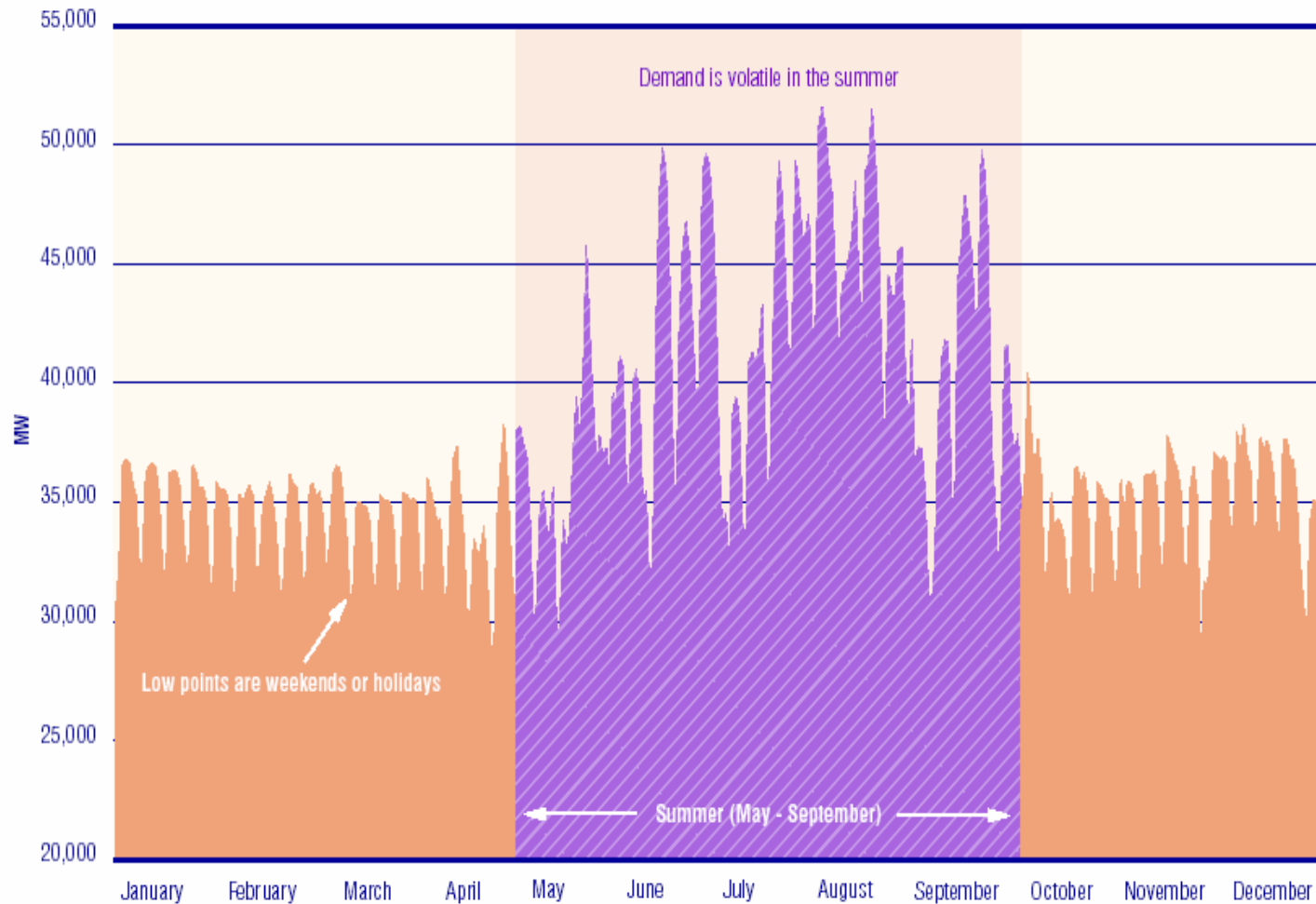
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Patterns of Daily Peak Demand

Figure II-1-11
Patterns of Daily Peak Demand



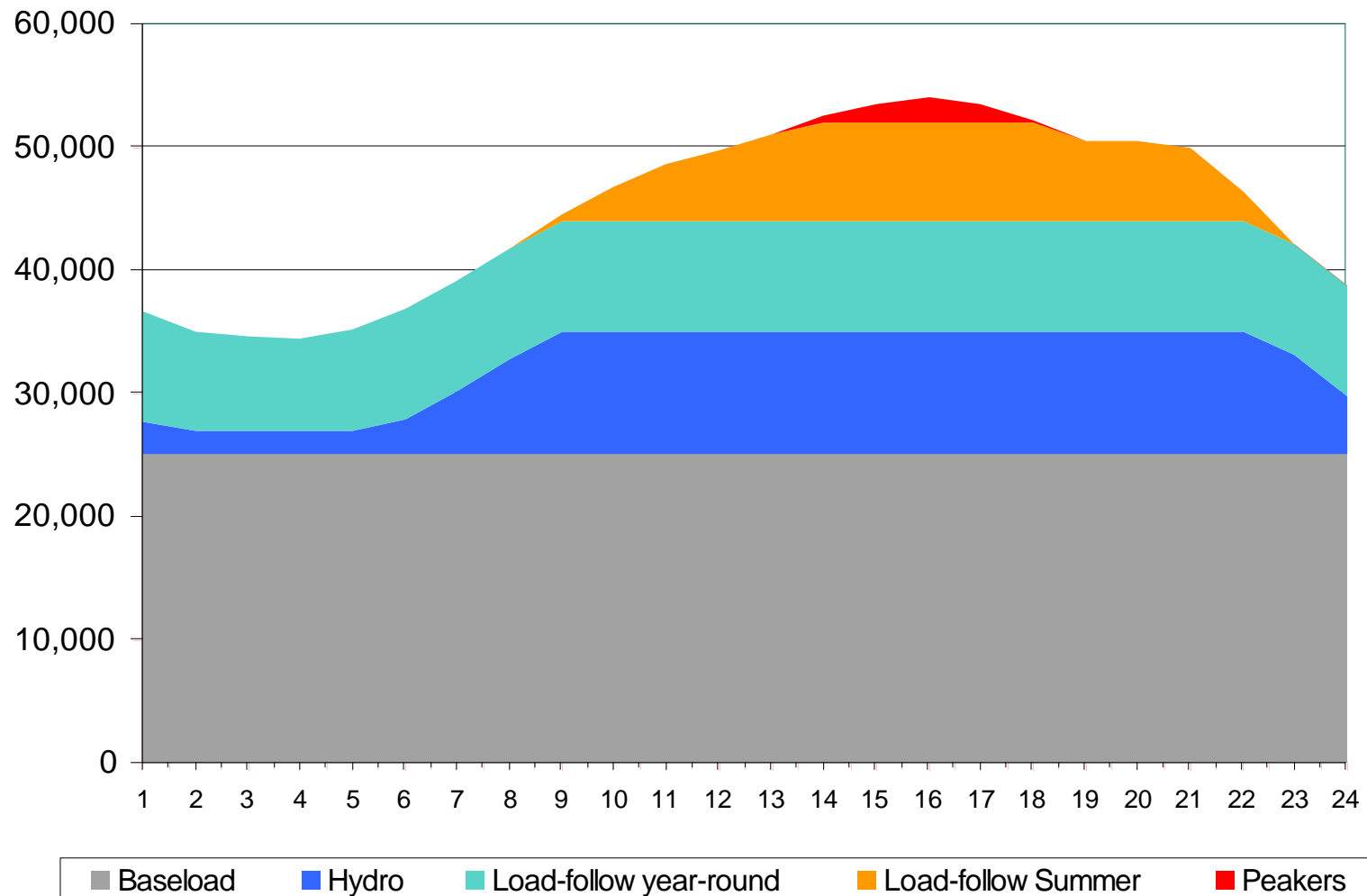
Source: CEC Staff

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Typical Peak Day Profile Supply/Demand

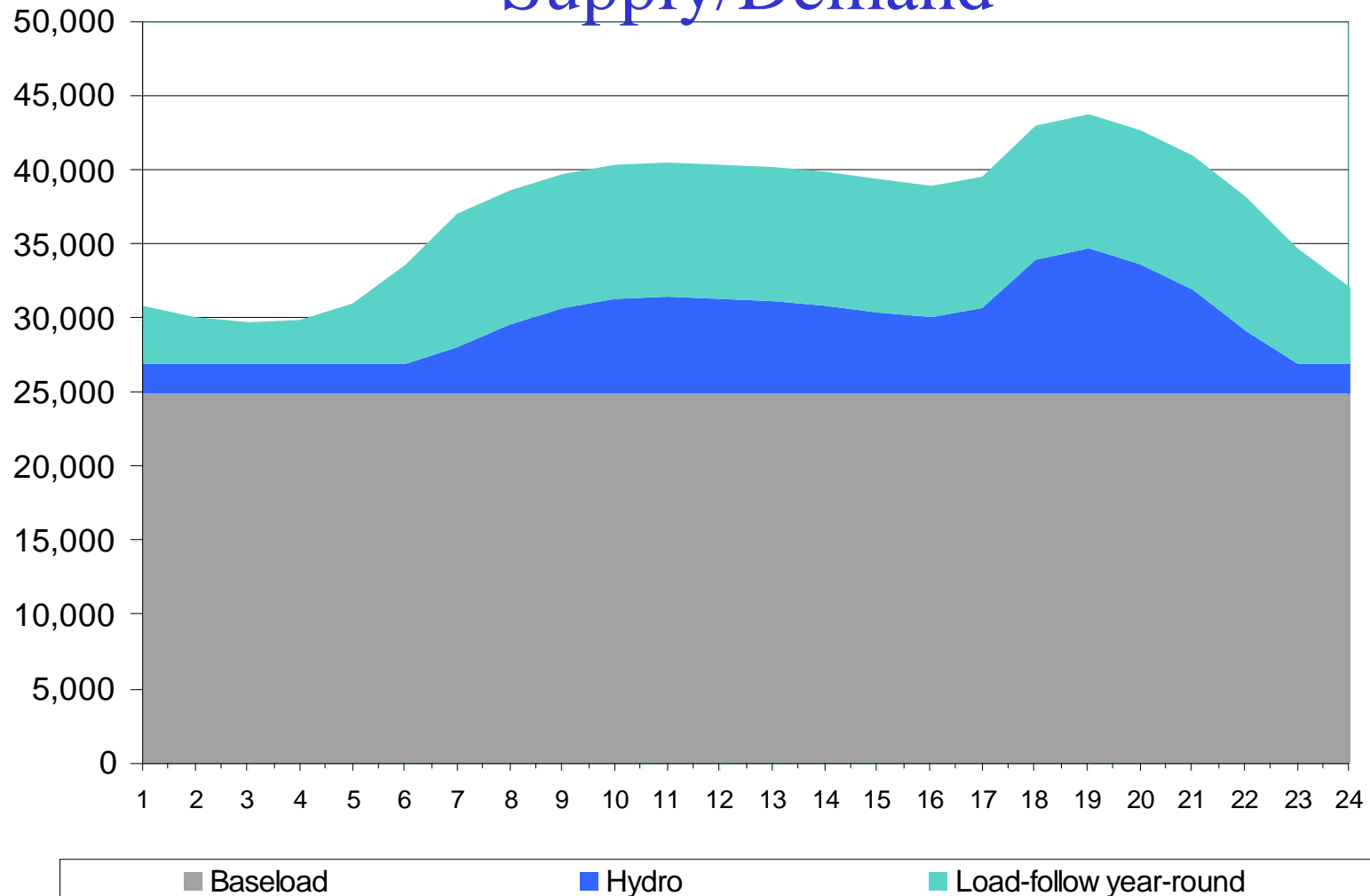


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Typical Off-Peak day Profile Supply/Demand

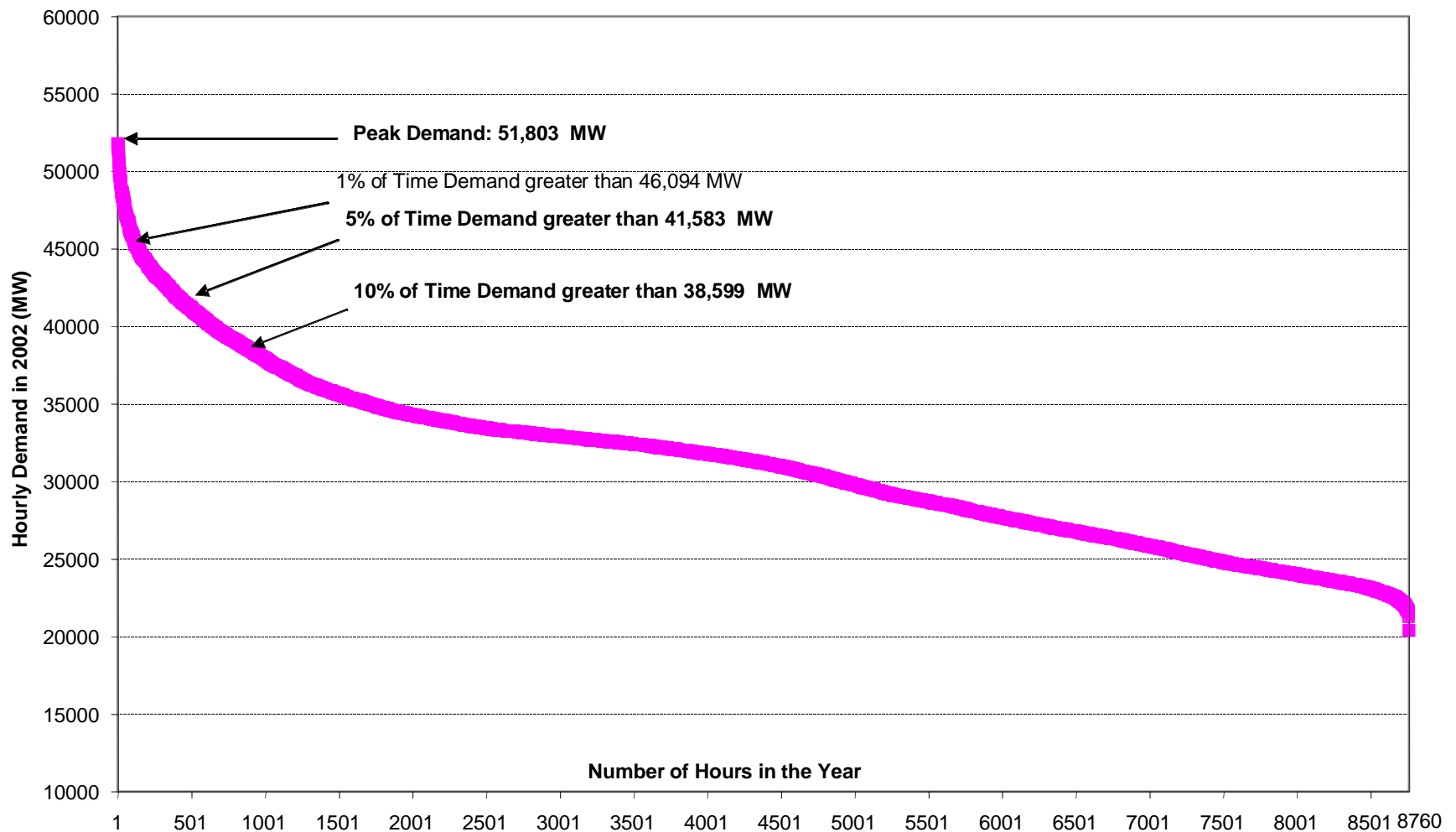


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2002 Statewide Load Duration Curve



Source: CEC Demand Office Staff

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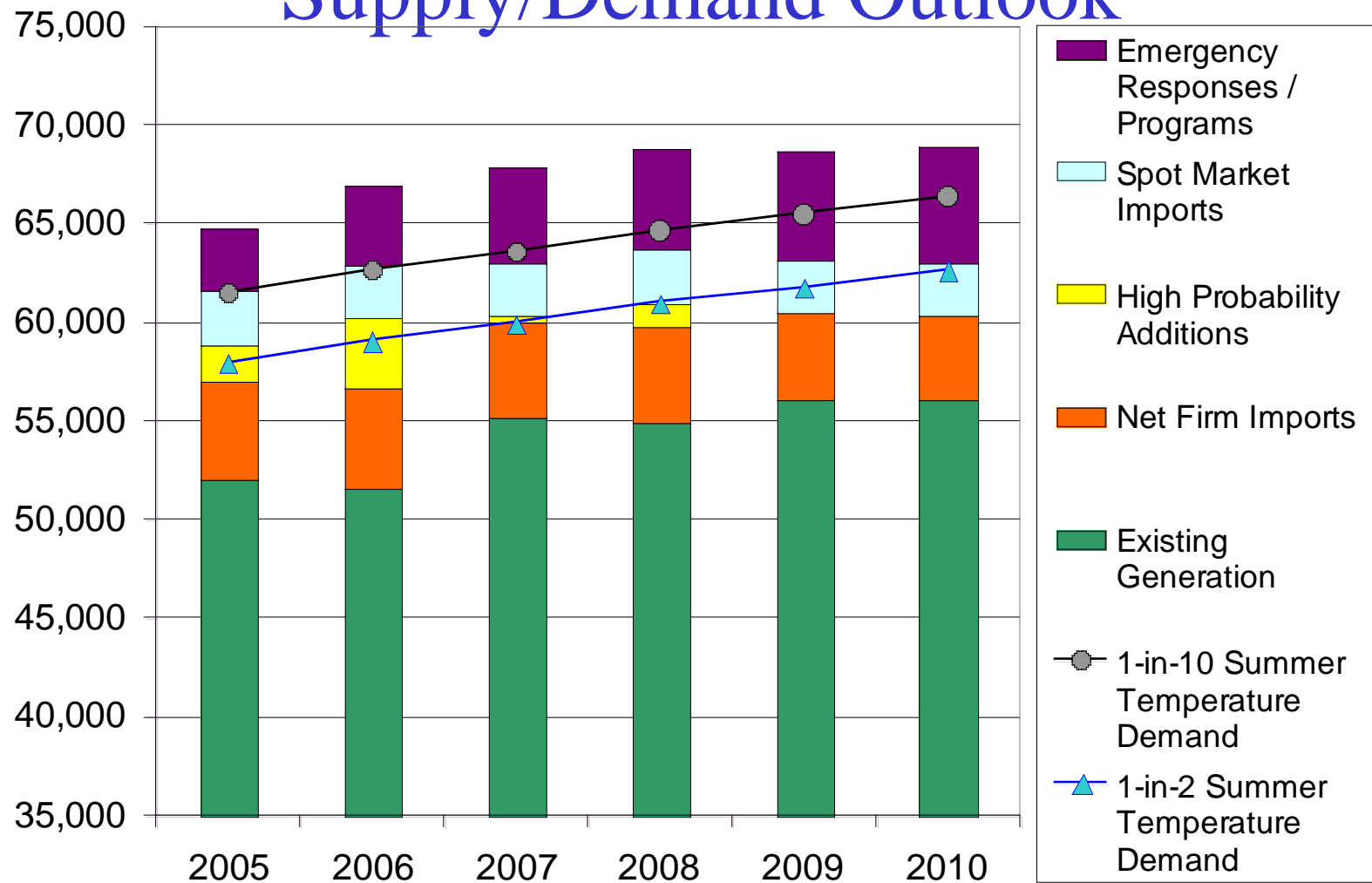


Duty Cycles and Fuel/Technology Types

- Baseload Plants (Coal, Nuclear, Large Hydro)
- Load-Following plants (Natural Gas, some Large Hydro)
- Peaker Plants
- What is SWING?
 - During years when precipitation is low and reservoirs are drawn down, natural gas plants are utilized more to make up for the decreased hydroelectric generation.
 - SWING also occurs during years when less energy is available for import into California.



Supply/Demand Outlook



Source: CEC Staff

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Near Term Electricity System Concerns from 2004 IEPR Update

- **Southern California: Reserves unacceptably low under normal and hot weather conditions.**
- **Statewide: Reserves low under hot weather conditions.**
- **Regional and local transmission congestion limit resource options.**
- **Potential aging power plant retirements may further reduce reserves**



Aging Power Plant Issues

- **Market forces are currently working to retire uneconomic plants.**
- **Aging power plants provide reliability and congestion management benefits.**
- **Aging plants that are not under contract are at significant risk of retirement.**
- **CEC's Aging Power Plant Study suggests that the threat to reliability from retirements should not be underestimated.**
- **Resource Adequacy requirements are one way to mitigate reliability concerns.**



Demand Side Management

- California's summer peak is "spikey"
- Most of the peaker plants only run a small number of hours per year- during peak demand periods.
- Technologies that reduce demand or shift demand from peak to off-peak can be implemented to reduce the need for new peaker plants.
- Demand response will remain limited until more end-users have TOU meters and TOU rates.



2003 Integrated Energy Policy Report Recommendations

- **Implement Energy Action Plan and Loading Order**
 - Accelerate Demand Response programs
 - Increase energy efficiency
 - Increase use of renewable energy
- **Improve sharing of existing resources**
- **Increase use of Distributed Generation**
- **Comprehensive transmission planning**



Summary

- California's electricity supply is provided by a diverse set of generation facilities located in state, in the western U.S., Canada and Mexico.
- The overall fuel-efficiency of the generation system has improved and the addition of new combined cycle plants will continue this trend.
- Intermediate load-following capacity plays an important role by allowing the system to respond to swings in the availability of hydroelectric and imports. Natural gas plants provide the major portion of the state's "swing" capacity.
- Aging power plants currently provide congestion management benefits, ancillary services as well as energy. The manner in which these plants are retired could have significant impacts on reliability and/or affect control operator dispatch decisions.